

3. Traceability

Heat-flux sensor calibrations are traceable to the primary detector standard for radiometric measurements. However, because of the range of radiant powers between the primary standard and the heat-flux sensor (microwatts to watts), the traceability chain involves multiple steps, shown in Fig. 1.

The primary detector standard is the High Accuracy Cryogenic Radiometer (HACR) [2], which uses low-power lasers to calibrate the responsivity of primary trap detectors. These primary trap detectors are used in turn in the Spectral Comparator Facility (SCF) [3], a lamp-illuminated monochromator system, to calibrate the responsivity of quantum efficient detectors (QED). The maximum radiant power for a QED is about 2 mW, which precludes its use to calibrate heat-flux sensors, for which the radiant power is several orders of magnitude greater.

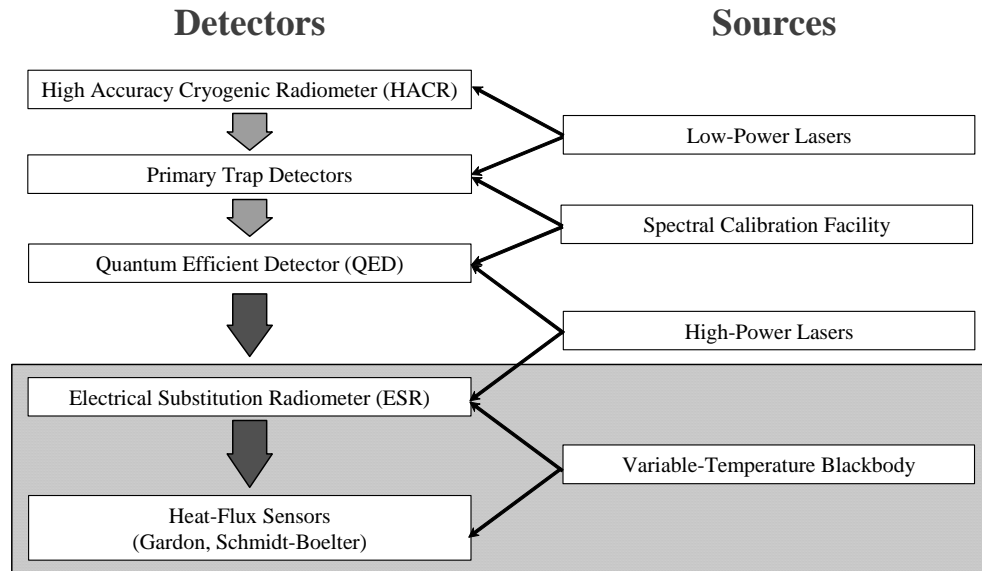


Figure 1. Traceability of heat-flux sensor calibrations

A cavity-type ESR operating at room temperature is the transfer standard for heat-flux sensor calibrations. The QED is used to calibrate the radiant power of a high-power krypton laser, which is then used to calibrate the responsivity of the ESR. The final step in the traceability chain, described in detail in the following, transfers the calibration from the ESR to the heat-flux sensor using the VTBB.